

R E M A R K S

This is in response to the Official Action of July 23, 2002. Claims 1-3 are pending in this application. Claims 1 and 3 have been amended as is further discussed below.

The specification has been amended to state that this application is a national phase application of International Application No. PCT/US99/26946, which was filed on November 16, 1999 and which published in English on May 25, 2001. It is respectfully submitted that no new matter has been added.

Claim 3 has been objected to under 37 C.F.R. 1.75(c) as improper for failing to further limit the subject matter of Claim 1. Accordingly, Claim 3 has been amended to recite that the oscillating mechanical member is coupled to a piezoelectric oscillator that oscillates at the frequency defined in the claim. It is respectfully submitted that the amendment is supported by the specification as originally filed (*see* page 4, lines 12-16 of the specification) and therefore does not constitute new matter. In view of the foregoing, withdrawal of the objection under 37 C.F.R. 1.75(c) to Claim 3 as improper for failing to further limit the subject matter of Claim 1 is respectfully requested.

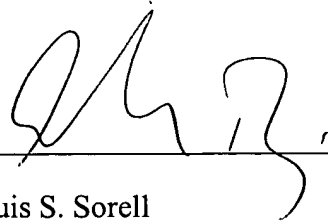
Claims 1-3 have been rejected under 35 U.S.C. § 102(a) as anticipated by WO 99/03630. The Examiner states that WO 99/03630 teaches, for example in Figures 1 and 3, a crucible and oscillating member meeting the limitations of Claims 1-3.

However, it is respectfully submitted that Claims 1-3 are not anticipated by WO 99/03630. Claim 1 has been amended to expressly recite that  $d_0$  is a variable representing the outlet diameter and that  $\theta$  represents a variable slant angle corresponding to said slanted radial portion. It is respectfully submitted that the amendment is supported by the specification as originally filed (*see* page 5, lines 17-19 of the specification) and therefore does not constitute new matter. In contrast, WO 99/03630 does not describe varying the outlet diameter  $d_0$  or the slant angle  $\theta$  to further increase the range of drop sizes produced. WO 99/03630 only describes inserting the pintle 303 to decrease the drop size. Accordingly, it is respectfully submitted that Claim 1 (and Claims 2-3 dependent on Claim 1) is not anticipated by WO 99/03630. In view of the foregoing, withdrawal of the rejection under 35 U.S.C. 102(a) of Claims 1-3 as anticipated by WO 99/03630 is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

In view of the foregoing, reconsideration and allowance of all claims in the application is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'LS Sorell', is written over a horizontal line.

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE****In the Specification:**

The following paragraph has been inserted on page 1 after the title:

**CROSS-REFERENCE TO RELATED APPLICATIONS**

This application is a national phase application of International Application No. PCT/US99/26946, which was filed on November 16, 1999 and which published in English on May 25, 2001.

**In the Claims:**

Claims 1 and 3 have been amended as follows:

1. (Amended) In a system for manufacturing a three-dimensional object by deposition of molten material drops on a substrate, an apparatus for producing said molten material drops comprising:

a crucible for holding a reservoir of molten material;

a conically-shaped orifice having a fixed outlet diameter disposed in the bottom of said crucible through which a jet of said molten material flows towards said substrate; and

an oscillating mechanical member for breaking said flow of molten material into said molten material drops, said member having a conically-shaped head for cooperating with said orifice and for continuously varying the effective size of said

orifice, said conically-shaped head comprising a slanted radial portion and a tip portion extending through the orifice, the effective diameter  $d_{\text{eff}}$  of said orifice and said jet being defined by the equation  $d_{\text{eff}} = [d_0^2 - (d_0 - \delta \tan \theta)^2]^{1/2}$ , wherein  $d_0$  [represents] is a variable representing said [fixed] outlet diameter,  $\delta$  represents the amount of said tip portion extending through the orifice, and  $\theta$  represents a variable slant angle corresponding to said slanted radial portion.

3. (Amended) The apparatus according to claim 1, wherein said oscillating mechanical member is coupled to a piezoelectric oscillator that oscillates at a frequency of  $f_{\text{opt}}$  defined by the equation  $f_{\text{opt}} = 0.225U_j/d_{\text{eff}}$ , wherein  $d_{\text{eff}}$  is the effective diameter of said jet and  $U_j$  is the velocity of said jet through said orifice.